氏　　名	Ayalew Ligaba
授与した学位	博　士
専攻分野の名称	学　術
学位授与番号	博甲第２９４９号
学位授与の日付	平成１７年　３月２５日
学位授与の要件	自然科学研究科資源管理科学専攻 （学位規則第４条第１項該当）
学位論文の題目	A study on the physiological, biochemical and molecular responses of plants to aluminum and phosphorus stresses （植物のアルミニウムとリン酸ストレスに対する生理、生化学および分子応答に関する研究）
論文審査委員	教授　松本　英明　　助教授　山本　洋子　　助教授　且原　真木

学位論文内容の要旨

Plant species, even cultivars of the same species respond differently to Al-toxicity and P-deficiency. Nevertheless, the responses of *Brassica napus* and *Lupinus pilosus* to the combined effects of aluminum and phosphorus stresses have never been reported before. Therefore, in the current study the responses of these plants have been investigated at a physiological, biochemical and molecular level. In rape, Al exposure significantly induced citrate and malate exudation, which was associated with enhanced biosynthesis and reduced degradation of organic acids, and up-regulation of a putative malate transporter gene in the roots. This enhanced exudation was more pronounced in P-sufficient plants. In greater purple lupin, P-deficiency enhanced the formation of proteoid roots which are characterized by the release of huge amount of citrate and proton. This enhanced citrate exudation was associated with an increase in plasma membrane H^+-ATPase activity and H^+-pump activity. On the other hand, Al did not have a significant role in the response.

論文審査結果の要旨

Plant species, even cultivars of the same species respond differently to Al-toxicity and P-deficiency. Nevertheless, the responses of *Brassica napus* and *Lupinus pilosus* to the combined effects of aluminum and phosphorus stresses have never been reported before. Therefore, in the current study the responses of these plants have been investigated at a physiological, biochemical and molecular level. In rape, Al exposure significantly induced citrate and malate exudation, which was associated with enhanced biosynthesis and reduced degradation of organic acids, and up-regulation of a putative malate transporter gene in the roots. This enhanced exudation was more pronounced in P-sufficient plants. In greater purple lupin, P-deficiency enhanced the formation of proteoid roots which are characterized by the release of huge amount of citrate and proton. This enhanced citrate exudation was associated with an increase in plasma membrane H^+-ATPase activity and H^+-pump activity. On the other hand, Al did not have a significant role in the response.

These results are original findings in the relationship between Al and phosphorus stress and have been published in international journals. Therefore this study is worthy of Ph.D.